

## **IN THE CLAIMS:**

This listing of claims will replace all prior versions, and listing, of claims in the application.

### **Listing of the Claims:**

1. (Currently amended) A phased array antenna system with controllable electrical tilt including:

a) an antenna (124) with multiple antenna elements; ~~(124U1 to 124L3);~~  
characterized in that the system (40) has:

a)b) apparatus means for providing two basis signals with variable relative delay therebetween,

b)c) splitting apparatus means ~~(106a, 106b)~~ for dividing the basis signals into signal components,

e)d) phase to power converting apparatus means ~~(110 to 114)~~ for converting the signal components into transformed components having powers which vary as the relative delay varies, and

d)e) power to phase converting apparatus means ~~(116 to 120)~~ for converting the transformed components into antenna element drive signals having phases which vary from antenna element (e.g. 124U1) to antenna element (e.g. 124U2) progressively across the antenna (124) when the antenna (124) is electrically tilted and which individually vary as the relative delay varies.

2.(Currently amended) A system according to Claim 1 ~~characterised in that~~ wherein the phase to power converting apparatus ~~is~~ comprises a plurality of hybrid radio frequency coupling devices ("hybrids") ~~(110 to 114) arranged to provide for providing~~ sums and differences of pairs of signal components, each pair having signal components from both basis signals.

3. (Currently amended) A system according to Claim 1 ~~characterised in that~~ wherein the phase to power converting ~~means is~~ apparatus comprises a plurality of 180 degree hybrids ~~(110 to~~

~~114)~~ ~~arranged to provide~~ for providing sums and differences of pairs of signal components, each pair having signal components from both basis signals.

4. (Currently amended) A system according to Claim 3 ~~characterised in that~~ wherein each pair has signal components of equal magnitude, but each pair's component magnitude is not equal to that of another pair.

5. (Currently amended) A system according to Claim 3 ~~characterised in that~~ wherein the hybrids are first hybrids (~~110 to 114~~) and the power to phase converting means apparatus incorporates a plurality of second hybrids (~~116 to 120~~) arranged to generate antenna element drive signals.

6. (Currently amended) A system according to Claim 5 ~~characterised in that~~ wherein the splitting means apparatus is a first splitting means apparatus (~~106a, 106b~~) and the power to phase converting means apparatus (~~116 to 120~~) incorporates a second splitting means apparatus (~~142e to 142h~~) ~~arranged to divide~~ for dividing the sums and differences into components for input to the second hybrids (~~144<sub>4</sub> to 144<sub>9</sub>~~).

7. (Currently amended) A system according to Claim 6 ~~characterised in that~~ wherein the first splitting means (~~106a, 106b~~) is ~~arranged to divide~~ for dividing each of the basis signals into three signal components.

8. (Currently amended) A system according to Claim 6 ~~characterised in that~~ wherein the second splitting means apparatus is a plurality of two-way splitters (~~142e to 142h~~).

9. (Currently amended) A system according to Claim 1 ~~characterised in that~~ wherein it is arranged such that all paths extending from basis signal provision to antenna elements contain the same numbers and types of components.

10. (Currently amended) A method of controlling electrical tilt of a phased array antenna system (40) including an antenna (124) with multiple antenna elements (~~124U1 to 124L3~~), ~~characterised in that~~ and wherein the method incorporates the steps of:

- a) providing two basis signals with variable relative delay therebetween,
- b) splitting the basis signals into signal components,
- c) converting the signal components into transformed components having powers which vary as the relative delay varies, and
- d) converting the transformed components into antenna element drive signals having phases which vary from antenna element (~~e.g. 124U1~~) to antenna element (~~e.g. 124U2~~) progressively across the antenna (124) when the antenna (124) is electrically tilted and which individually vary as the relative delay varies.

11. (Currently amended) A method according to Claim 10 ~~characterised in that~~ wherein step c) is implemented using a plurality of hybrids (~~110 to 114~~) ~~arranged to provide for~~ providing sums and differences of pairs of signal components, each pair having signal components from both basis signals.

12. (Currently amended) A method according to Claim 10 ~~characterised in that~~ wherein step c) is implemented using a plurality of 180 degree hybrids (~~110 to 114~~) ~~arranged to provide~~ providing sums and differences of pairs of signal components, each pair having signal components from both basis signals.

13. (Currently amended) A method according to Claim 12 ~~characterised in that~~ wherein each pair has signal components of equal magnitude, but each pair's component magnitude is not equal to that of another pair.

14. (Currently amended) A method according to Claim 12 ~~characterised in that~~ wherein the hybrids are first hybrids and step d) is implemented using a plurality of second hybrids (~~116 to 120~~) ~~arranged to generate for~~ generating the antenna element drive signals.

15. (Currently amended) A method according to Claim 14 ~~characterised in that~~ wherein splitting in step b) is a first splitting and a second splitting is implemented in step d) to divide the sums and differences into components for input to the second hybrids (~~116 to 120~~).

16. (Currently amended) A method according to Claim 15 ~~characterised in that~~ wherein the first splitting divides each of the basis signals into three signal components.

17. (Currently amended) A method according to Claim 15 ~~characterised in that~~ wherein the second splitting is a plurality of two-way splits.

18. (Currently amended) A method according to Claim 10 ~~characterised in that all paths extending from basis signal provision to antenna elements (124U1 to 124L3) including supplying antenna element drive signals to antenna elements via paths extending from basis signal provision and containing~~ contain the same numbers and types of components.